

AMENDMENTS TO THE CLAIMS

Claim 1 (previously presented): A slide drive device for a press machine having a slide, comprising:

adjusting means for adjusting said slide drive device;
said adjusting means to adjust a stroke of said slide
and being pivotable about a center position to adjust said stroke;
said center position being one of a top and a bottom dead center position of said slide;
said adjusting means provided to receive a reciprocating motion;
a connecting link coupled to said adjusting means;
guiding means for guiding said slide drive device coupled to said connecting link;
said connecting link being effective to transfer said reciprocating motion to said guiding
means;
said guiding means being effective to convert said reciprocating motion to a linearly guided
displacement motion;
first and second drive branching links separately coupled to said guiding means;
first and second toggle means coupled respectively to the first and second drive branching
links, and said first and second toggle means coupled separately to the slide;
wherein the first and second drive branching links respectively converts the linearly guided
displacement motion to a toggling motion of the first and second toggle means, and the first and
second toggle means transfer the toggling motion to a linear cyclic motion of the slide.

Claim 2 (previously presented): A slide drive device, according to claim 1, further comprising:

a connecting rod;
said connecting rod slidably guided by said adjusting means;
a crank shaft;
an eccentric part on said crank shaft;
said eccentric part having said reciprocating motion;
said connecting rod operably connects said eccentric part to said adjusting means; and

said connecting rod being effective to transfer said reciprocating motion to said adjusting means whereby said slide operates through said cycle.

Claim 3 (previously presented): A slide drive device, according to claim 2, wherein:

said adjusting means is operably affixed to said connecting rod;

said adjusting means is operable to guide said connecting rod along a specified trajectory;

and

said adjusting means is pivotable about said center position to adjust said specified trajectory whereby said stroke is adjusted.

Claim 4 (withdrawn): A slide drive device, according to claim 3, further comprising:

said first and said second upper toggle means;

a rotation center in each said first and second upper toggle means;

said rotation center permitting said first and second upper toggle means to rotate in an arc;

a first link connects each said rotation center to said at least one drive branching link;

said at least one drive branching link effective to transfer said guiding displacement to each said first and second upper toggle link means;

a first and a second lower toggle link;

a second link operably connects each said rotation center to each respective said lower toggle link; and

said first and second upper toggle means being effective to transfer said guiding displacement through said second links to respective said first and second lower toggle links and said slide whereby said slide operates through said cycle while maintaining a left and right balance.

Claim 5 (withdrawn): A slide drive device, according to claim 4, further comprising:

a guide board in said adjusting means;

a groove in said guide board;

a slider being slidable in said groove;

a pin extending from said slider;

said groove and said pin being pivotable about said center position;
one end of a first and second end of said connecting rod;
said one end operably fixed to said pin; and
said slider and said pin being effective to transfer said reciprocating motion to said connecting link and said guiding means.

Claim 6 (withdrawn): A slide drive device according to claim 5, further comprising:

a base in said guiding means;
a groove in said base;
said groove being along a centerline between each said upper toggle means;
a slider being slidable in said groove;
said connecting link operably connected to said slider;
said connecting link transferring said reciprocating motion to said slider whereby said slider operates along said centerline;
said at least one drive branching link operably connected to said slider; and
said at least one drive branching link and said slider transferring said guiding displacement to said first and second upper toggle means whereby said slide operates through said cycle while maintaining a left and right balance along said centerline.

Claim 7 (withdrawn): A slide drive device according to claim 6, further comprising:

a trajectory pin;
a trajectory forming link;
said trajectory pin in said adjusting means;
said trajectory pin opposite said center position on said guide board;
said trajectory forming link operably connecting said trajectory pin to said one end of said connecting rod; and
said trajectory pin, said trajectory forming link, and said adjusting means being effective to convert said reciprocating motion of said one end to an arc-shaped trajectory.

Claim 8 (withdrawn): A slide drive device according to claim 6, wherein:

said adjusting means is operable at a position equidistant between said first and second upper toggle means;

said crank shaft and said eccentric part is below said adjusting means; and

said guide means is above said adjusting means opposite said crank shaft.

Claim 9 (withdrawn): A slide drive device according to claim 6, further comprising:

a first and second dynamic balancer means;

a first and second retention link;

said first and second retention links operably connecting each respective said upper toggle means to each respective said dynamic balancer means; and

each said first and second dynamic balancer means and said first and second retention links having a shape and a weight adaptable to each respective said first and second upper toggle link and said slide whereby vibration is minimized when said first and second upper toggle means drive said slide in said cycle

Claim 10 (withdrawn): A slide drive device, according to claim 5, further comprising:

a first pin in each said first and second upper toggle means;

said first links connects said first pins to each respective said rotation center on each said first and second upper toggle means; and

said at least one drive branching link operably connecting said first and second upper toggle means at said first pins on a common inner tangent line to each said arc.

Claim 11 (withdrawn): A slide drive device, according to claim 10, further comprising:

a first and second end on said at least one drive branching link;

said first and second ends operably at said first pins on said first and second upper toggle means;

a connection position on said drive branching link between said first and second ends; and

said connecting link operably connecting to said drive branching link at said connection position along said drive branching link..

Claim 12 (withdrawn): A slide drive device, according to claim 11, further comprising:

a first and second dynamic balancer means;

a first and second retention link;

said first and second retention links operably connecting each respective said upper toggle means to each respective said dynamic balancer means; and

each said first and second dynamic balancer means and said first and second retention links having a shape and a weight adaptable to each respective said first and second upper toggle link and said slide whereby vibration is minimized when said first and second upper toggle means drive said slide in said cycle

Claim 13 (withdrawn): A slide drive device, according to claim 12, further comprising:

said connecting link operably connects to said drive branching link at said connection position;

said connection position being equidistant said first and second ends; and

said drive shaft and said adjusting means are above said first and second upper toggle means and said drive branching link.

Claim 14 (withdrawn): A slide drive device, according to claim 12, further comprising:

said connecting link operably connects to said drive branching link at one of said first and second ends; and

said drive shaft and said adjusting means are below said first and second upper toggle means and said drive branching link.

Claim 15 (withdrawn): A slide drive device, according to claim 12, further comprising:

said connecting link operably connects to said drive branching link at one of said first and second ends;

said drive shaft is below said first and second upper toggle means;

 said adjusting means is above said first and second upper toggle means opposite said drive shaft; and

 said guiding means is between said drive shaft and said adjusting means.

Claim 16 (withdrawn): A slide drive device, according to claim 12, further comprising:

 said connecting link operably connects to said drive branching link at one of said first and second ends;

 said drive shaft above said first and second upper toggle means;

 said adjusting means below said first and second upper toggle means opposite said drive shaft; and

 said guiding means is between said drive shaft and said adjusting means.

Claim 17 (previously presented): A slide drive device for a press machine having a slide, comprising:

 adjusting means, for adjusting said slide drive device, having a top and a bottom dead center positions;

 said adjusting means permitting an adjustment of said slide without changing said one dead center position;

 said adjustment of said slide changing said other dead center position of said slide;

 said adjusting means being pivotable to a specified angle to adjust a stroke of said slide; and

 said adjusting means transferring a sliding, reciprocating motion to said slide.

Claim 18 (previously presented): A slide drive device, according to claim 17, further comprising:

 guiding means for guiding said slide drive device;

 first and second toggle means separately coupled to said guiding means;

 said first and second toggle means driving said slide in a cycle; and

said guiding means being effective to transmit said adjustment of said slide to said first and second toggle means whereby said stroke is adjusted without changing said other dead center position.

Claim 19 (previously presented): A slide drive device, according to claim 18, further comprising:
a center position on said adjusting means;
said center position being proximate said one dead center position;
said adjusting means being operable about said center position to effect said adjustment of said slide.

Claim 20 (previously presented): A slide drive device, according to claim 19, further comprising:
a connecting rod coupled to said adjusting means;
said connecting rod receiving a reciprocating motion and transmitting said reciprocating motion to said adjusting means;
a connecting link coupled to said adjusting means;
said connecting link being effective to transmit said reciprocating motion from said adjusting means to said guiding means; and
said guiding means being effective to convert said reciprocating motion to a guiding displacement, whereby said slide operates in said cycle.

Claim 21 (previously presented): A slide drive device, according to claim 20, further comprising:
first and second drive branching links separately coupled to said guiding means; and
said first and second drive branching links being effective to transfer said guiding displacement to the first and second toggle links respectively, whereby said slide is driven in said stroke.

Claim 22 (previously presented): A slide drive device, according to claim 21, wherein:
said first and second drive branching links transmit said adjustment of said slide to said first and second toggle links, whereby said slide is adjusted in said stroke.

Claim 23 (withdrawn): A slide drive device, according to claim 1, wherein:

 said adjusting means being a single, shared adjusting means on which the motion of each of said at least one drive branching link is dependent.

Claim 24 (withdrawn): A slide drive device, according to claim 1, further comprising:

 said first and said second upper toggle means;
 a rotation center in each said first and second upper toggle means;
 said rotation center permitting said first and second upper toggle means to rotate in an arc;
 a first link connects each said rotation center to said at least one drive branching link;
 said at least one drive branching link effective to transfer said guiding displacement to each said first and second upper toggle link means;
 a first and a second lower toggle link;
 a second link operably connects each said rotation center to each respective said lower toggle link; and
 said first and second upper toggle means being effective to transfer said guiding displacement through said second links to respective said first and second lower toggle links and said slide whereby said slide operates through said cycle while maintaining a left and right balance.

Claim 25 (withdrawn): A slide drive device, according to claim 2, further comprising:

 a guide board in said adjusting means;
 a groove in said guide board;
 a slider being slidable in said groove;
 a pin extending from said slider;
 said groove and said pin being pivotable about said center position;
 one end of a first and second end of said connecting rod;
 said one end operably fixed to said pin; and
 said slider and said pin being effective to transfer said reciprocating motion to said connecting link and said guiding means.

Claim 26 (withdrawn): A slide drive device according to claim 1, further comprising:

a first and second dynamic balancer means;

a first and second retention link;

said first and second retention links operably connecting each respective said upper toggle means to each respective said dynamic balancer means; and

each said first and second dynamic balancer means and said first and second retention links having a shape and a weight adaptable to each respective said first and second upper toggle link and said slide whereby vibration is minimized when said first and second upper toggle means drive said slide in said cycle.

Claim 27 (withdrawn): A slide drive device, according to claim 1, wherein said crank shaft and said adjusting means are above said first and second upper toggle means and said at least one drive branching link.

Claim 28 (withdrawn): A slide drive device according to claim 1, further comprising:

a base in said guiding means;

a groove in said base;

said groove being along a centerline between each said upper toggle means;

a slider being slidable in said groove;

said connecting link operably connected to said slider;

said connecting link transferring said reciprocating motion to said slider whereby said slider operates along said centerline;

said at least one drive branching link operably connected to said slider; and

said at least one drive branching link and said slider transferring said guiding displacement to said first and second upper toggle means whereby said slide operates through said cycle while maintaining a left and right balance along said centerline.

Claim 29 (withdrawn): A slide drive device according to claim 17, wherein:

said adjusting means is a single, shared adjusting means on which the motion of each of at least one drive branching link is dependent.

Claim 30 (withdrawn): A slide drive device, according to claim 22, further comprising:

 said first and said second upper toggle means;
 a rotation center in each said first and second upper toggle means;
 said rotation center permitting said first and second upper toggle means to rotate in an arc;
 a first link connects each said rotation center to said at least one drive branching link;
 a first and a second lower toggle link;
 a second link operably connects each said rotation center to each respective said lower toggle link; and

 said first and second upper toggle means being effective to transfer said guiding displacement through said second links to respective said first and second lower toggle links and said slide whereby said slide operates through said cycle while maintaining a left and right balance.

Claim 31 (withdrawn): A slide drive device, according to claim 20, further comprising:

 a guide board in said adjusting means;
 a groove in said guide board;
 a slider being slidable in said groove;
 a pin extending from said slider;
 said groove and said pin being pivotable about said center position;
 one end of a first and second end of said connecting rod;
 said one end operably fixed to said pin; and
 said slider and said pin being effective to transfer said reciprocating motion to said connecting link and said guiding means.

Claim 32 (withdrawn): A slide drive device according to claim 18, further comprising:

 a first and second dynamic balancer means;
 a first and second retention link;

said first and second retention links operably connecting each respective said upper toggle means to each respective said dynamic balancer means; and

each said first and second dynamic balancer means and said first and second retention links having a shape and a weight adaptable to each respective said first and second upper toggle link and said slide whereby vibration is minimized when said first and second upper toggle means drive said slide in said cycle.

Claim 33 (previously presented): A slide drive device for a press machine having a slide, comprising:

an adjusting mechanism in said slide drive device having a top and a bottom dead center positions;

said adjusting mechanism permitting an adjustment without changing said one dead center position;

said adjustment changing said other dead center position of said slide; and

said adjusting mechanism being pivotable about a center position to adjust a stroke of said slide.

Claim 34 (previously presented): A slide drive device, according to claim 21, wherein:

said means for adjusting said slide drive device being a single, shared means for adjusting said slide drive device on which the motion of each of said at least one drive branching link is dependent.

Claim 35 (previously presented): A slide drive device, according to claim 1, wherein said means for adjusting said slide drive device comprises a guide board with a slider that slides linearly while receiving said reciprocating motion.

Claim 36 (previously presented): A slide drive device, according to claim 17, wherein said means for adjusting said slide drive device comprises a guide board with a slider that slides linearly while transferring said sliding, reciprocating motion to said slide.

Claim 37 (previously presented): A slide drive device for a press machine having a slide, comprising:

- an adjusting mechanism for adjusting a stroke of said slide;
- a connecting link, coupled to said adjusting mechanism, for transferring a reciprocating motion of said adjusting mechanism;
- a guiding mechanism, coupled to said connecting link, for converting the reciprocating motion of the adjusting mechanism into a linear motion;
- first and second drive branching links, separately coupled to the guiding mechanism, for transferring the linear motion into a toggling motion;
- first and second toggle links, respectively coupled to the first and second drive branching links, for being toggled by the drive branching links; and
- a plunger coupled to the first and second toggle links, and said plunger coupled to the slider to convert the toggling motion into a stroking motion of the slider.

Claim 38 (previously presented): A slide drive device for a press machine of claim 37, further comprising:

- first and second balancer links coupled to the first and second toggle links respectively;
- first and second balancers connected to the first and second balancer links respectively such that when the first and second toggle links move the first and second balancer links, the first and second balancers move in an opposite direction of the slide.